

# Innovations in Public Health Surveillance: The National Bioterrorism Syndromic Surveillance Demonstration Project

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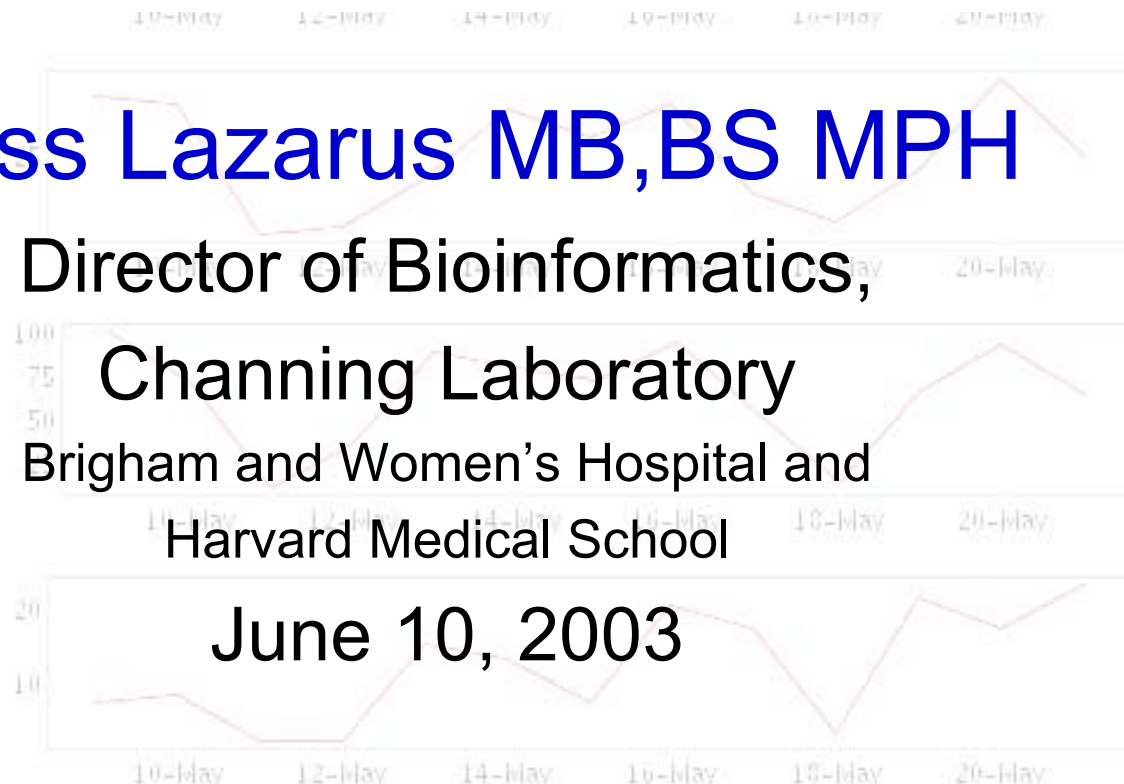
Brigham and Women's Hospital and  
Harvard Medical School

June 10, 2003

Fever

Gastrointestinal

Hemorrhagic



Report Documentation Page				Form Approved OMB No. 0704-0188	
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1. REPORT DATE <b>10 JUN 2003</b>		2. REPORT TYPE <b>N/A</b>		3. DATES COVERED <b>-</b>	
4. TITLE AND SUBTITLE <b>Innovations in Public Health Surveillance: The National Bioterrorism Syndromic Surveillance Demonstration Project</b>				5a. CONTRACT NUMBER	
				5b. GRANT NUMBER	
				5c. PROGRAM ELEMENT NUMBER	
6. AUTHOR(S)				5d. PROJECT NUMBER	
				5e. TASK NUMBER	
				5f. WORK UNIT NUMBER	
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) <b>Channing Laboratory; Brigham and Womens Hospital; Harvard Medical School</b>				8. PERFORMING ORGANIZATION REPORT NUMBER	
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)				10. SPONSOR/MONITOR'S ACRONYM(S)	
				11. SPONSOR/MONITOR'S REPORT NUMBER(S)	
12. DISTRIBUTION/AVAILABILITY STATEMENT <b>Approved for public release, distribution unlimited</b>					
13. SUPPLEMENTARY NOTES <b>See also ADM001576., The original document contains color images.</b>					
14. ABSTRACT					
15. SUBJECT TERMS					
16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT <b>UU</b>	18. NUMBER OF PAGES <b>23</b>	19a. NAME OF RESPONSIBLE PERSON
a. REPORT <b>unclassified</b>	b. ABSTRACT <b>unclassified</b>	c. THIS PAGE <b>unclassified</b>			

# Outline

- ◆ Electronic records for surveillance
- ◆ Syndromic surveillance for BT
- ◆ HPHC/MDPH System
- ◆ National Demonstration Project
- ◆ Issues and challenges
- ◆ Lessons

# Electronic records for surveillance

- ◆ BT - timeliness is crucial
- ◆ EMR potentially “real time” with Dx
- ◆ Increasingly available
  - ◆ Large group practices, HMOs
- ◆ Low marginal cost
  - ◆ Already in a database somewhere
- ◆ “Value add” - eg BT surveillance

# Syndromic Surveillance for BT

- ◆ First signs - non-specific prodrome
- ◆ ICD highly specific/granular
  - ◆ Clinician coding styles
  - ◆ Systematic coding influences
- ◆ Aggregate ICD into broad syndromes
- ◆ Currently 12 - eg “Respiratory Infection”
- ◆ HPHC proof of concept

https://btsurveillance.org/btpublic

techbargains.com - Cheapest computer de... Channing Labs/HPHC/HVMA Bioterrorism P... Zoep on https://wchanning.bwh.harvard.edu

 **Bioterrorism Surveillance**

## Boston Bioterrorism Surveillance Daily Reports

Select from the list of pages below by clicking on the link of interest.  
Please note that links marked "(Private)" require a valid UserID and Password.

[\(Private\) View the reports](#) of daily syndrome episodes for greater Boston  
[Publication about detection of acute illness clusters](#) (Emerging Infectious Diseases)  
[Publication about syndromic surveillance methods](#) (BioMed Central)  
[Preprint - article in press at JUH](#) on using minimally identifiable data for syndromic BT surveillance

# http://btsurveillance.org

## Public web site with access to publications and information about the project

suggestions or enquiries may be directed to [Ross Lazards](#), infectious Disease and Epidemiology related enquiries to [Rich Platt](#), statistical questions to [Ken Kleinman](#), questions about report programming and Epicare interface to [Inna Dashevsky](#)

If you have been assigned a userid and password for this site, you may click on the "View the reports" link above, then type these into the authentication dialogue box to identify yourself to gain access. Please use the link at the bottom of this page to contact the Webmaster if you have been assigned a UserID and password but are experiencing technical difficulties accessing the site. We regret that technical support may not be available outside normal business hours (Local time when you loaded this page was 2003/04/22 10:17:11.3124 GMT-4).

Please direct any requests for access to the material to [the project Administrative Officer](#).

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last modified 25 Mar 2003





























Massachusetts Department of Public Health  
 Daily Public Surveillance Report of Office Visits  
 With Diagnoses Corresponding to Infection Syndromes  
 Previous 30 Days Only. [Click here to see the entire period](#)

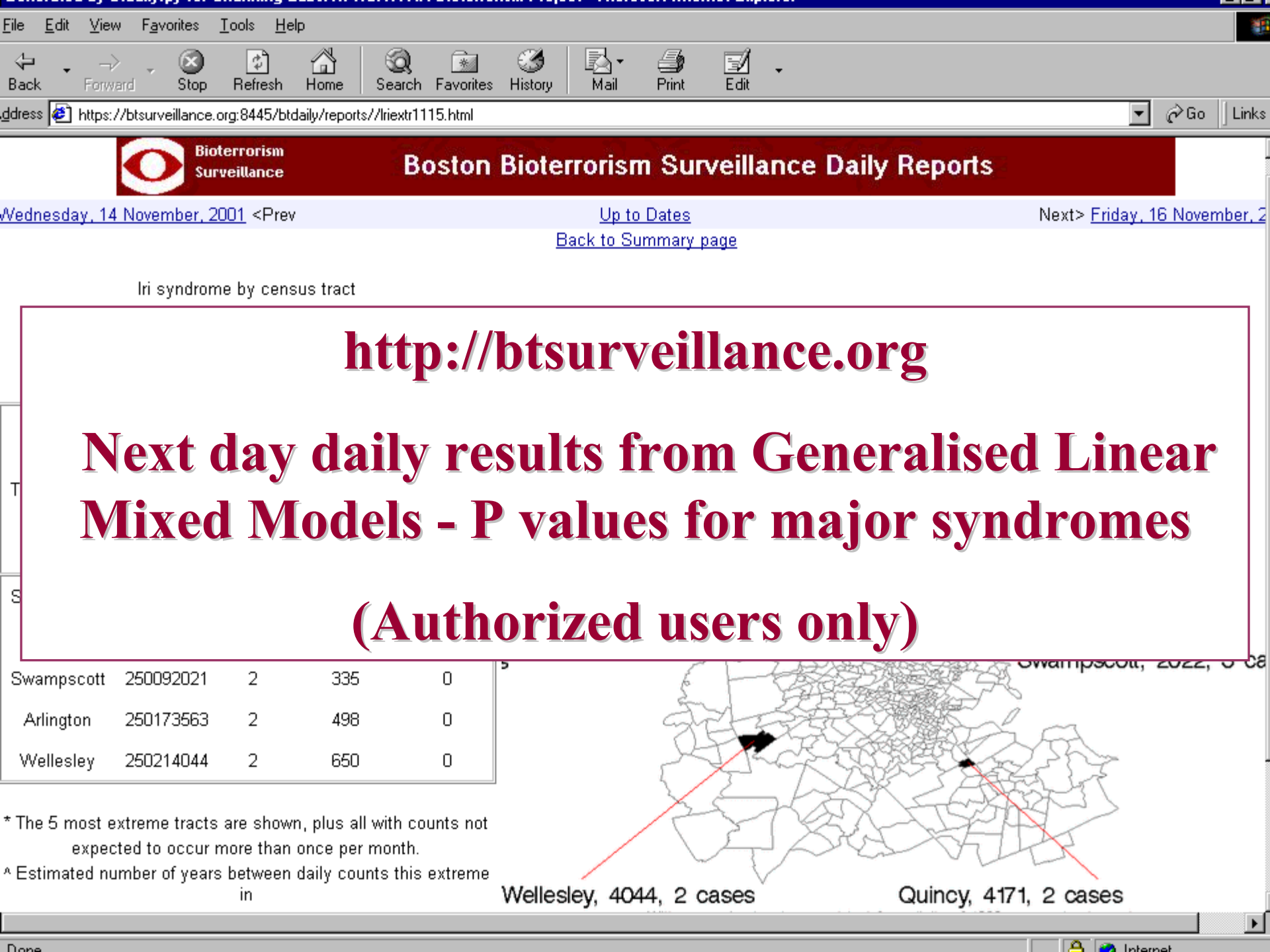
Click on a date (eg **Monday, 21 April, 2003**) to see a Summary report.  
 Click on an individual syndrome colored rate bar for a detailed syndrome report and map.  
 URI=Upper Respiratory Infection, LRI=Lower Respiratory Infection, UGI=Upper Gastrointestinal Infection, LGI=Lower Gastrointestinal Infection

<http://btsurveillance.org>

Regular daily reports  
since October 31 2001

(Authorized users only)

<a href="#">Tuesday, 01 April, 2003</a>						1.511
<a href="#">Monday, 31 March, 2003</a>						1.597
<a href="#">Sunday, 30 March, 2003</a>						0.448
<a href="#">Saturday, 29 March, 2003</a>						0.510
<a href="#">Friday, 28 March, 2003</a>						1.228
<a href="#">Thursday, 27 March, 2003</a>						1.271
<a href="#">Wednesday, 26 March, 2003</a>						1.400
<a href="#">Tuesday, 25 March, 2003</a>						1.370
<a href="#">Monday, 24 March, 2003</a>						1.941
<a href="#">Sunday, 23 March, 2003</a>						0.485





Linelist for Monday, 2 June 2003  
 For use only by Mass. Dept. of Public Health personnel  
 Not for distribution

Syndrome	Visit ID#	Age	Sex	Temp	Diag at the visit	Diagnosis Description	Enc. Type	Patient ZIP code
URI/TEMP>=100	161	9	F	100.3	034.0	STREP SORE THROAT	Visi	
URI/TEMP>=100	162	39	F	100.1	034.0	STREP SORE THROAT	URGE	
DERM	28	73	F	.	733.00	OSTEOPOROSIS NOS	Visi	

**<http://btsurveillance.org>**

**Detailed individual records on line for  
immediate access**

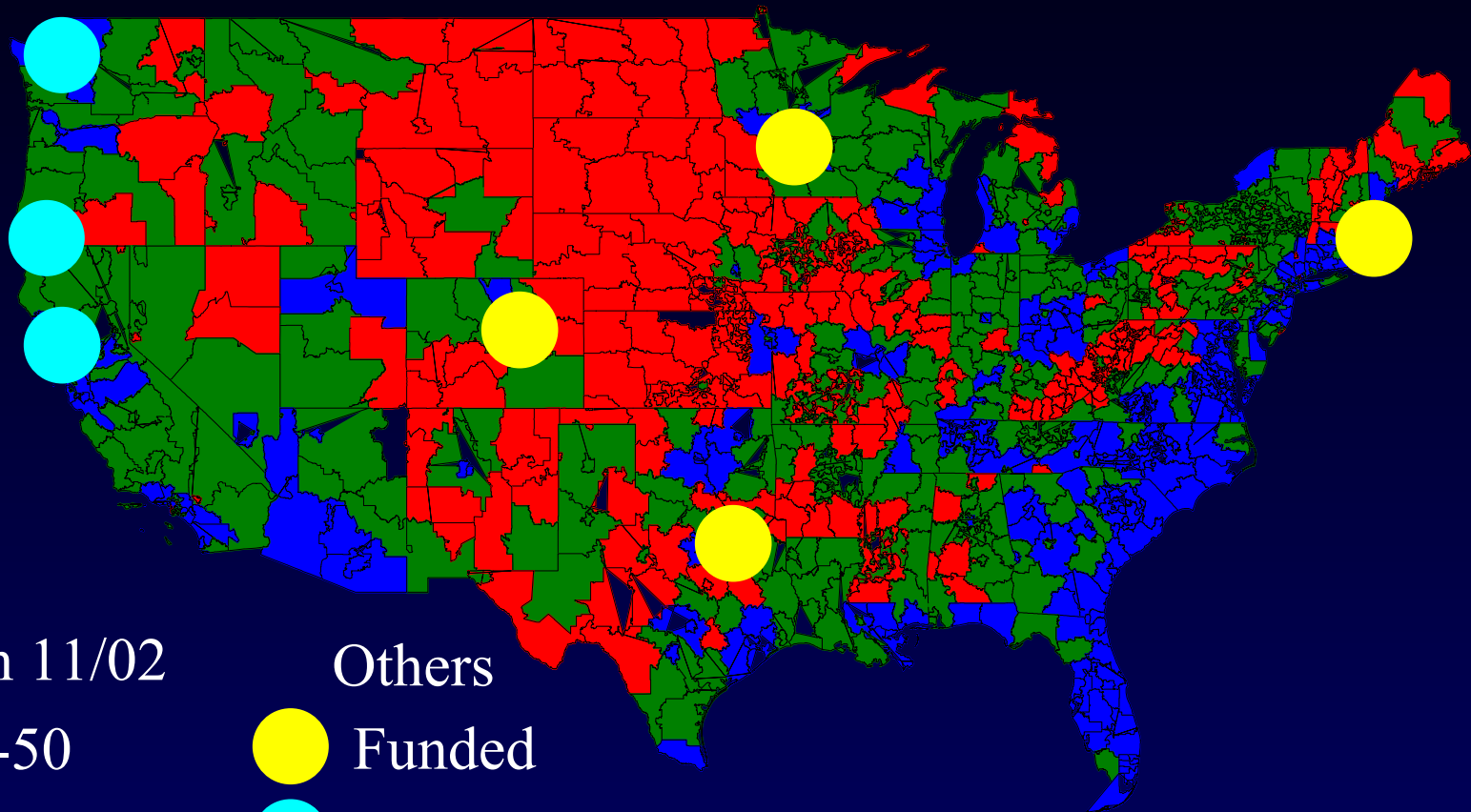
**(Highly restricted authorized users only)**

DERM	123	71	F	.	287.5	THROMBOCYTOPENIA NOS	Tele	
DERM	79	87	F	.	787.91	DIARRHEA	Visi	
DERM	79	87	F	.	401.9	HYPERTENSION NOS	Visi	
DERM	79	87	F	.	287.2	PURPURA NOS	Visi	
DERM	79	87	F	.	569.42	ANAL OR RECTAL PAIN	Visi	
DERM	79	87	F	.	715.90	OA NOS-UNSPEC	Visi	
DERM	192	86	F	.	287.5	THROMBOCYTOPENIA NOS	Tele	
DERM	40	31	M	.	782.7	SPONTANEOUS ECCHYMOSES	Visi	

# National Demonstration Project

- ◆ Electronic health records
- ◆ Office visits, nurse telephone triage calls
- ◆ ~20 million people.
- ◆ 50 states.
- ◆ Distributed processing
- ◆ Centralized reporting
- ◆ Syndrome count data only
- ◆ HIPAA “deidentified” (statistician’s cert.)

# National BT Demo Program



Optum 11/02

Others

1-50



Funded

51-250



Pending or in discussion

251+

# National Demonstration Project design features

- ◆ Scalable, data from many sources.
- ◆ Health plans put data extracts on a PC they control for processing.
- ◆ Analysis and reporting programs provided by data center.
- ◆ Internet-based communication.
- ◆ Encounter-level data stays with health plan or provider until health department requires it.
- ◆ Adaptable to other public health uses.

# Surveillance strategy

- ◆ Extract encounters with an ICD9 code of interest.
- ◆ Initially daily. Potentially more frequently
- ◆ Group encounters into syndromes.
- ◆ Identify INITIAL visit for each episode of illness.
- ◆ Map episodes to the patient's home ZIP code initially
- ◆ Geocoding -> census tract when available
- ◆ Transfer summary data to data center
- ◆ Identify statistically “extreme” regions each period.
- ◆ Notify data provider and public health agency.

Tuesday, April 22, 2003

Go to Today



April 2003						
Sun	Mon	Tue	Wed	Thu	Fri	Sat
30	31	1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19

```

22/04/2003 10:45:46: natdemobtconsole.py started
22/04/2003 10:45:46: Read in 43295 zip codes
22/04/2003 10:45:46: http://www.time.gov contacted.

```

**Identifiable data is all processed locally using software provided by the Datacenter**

**Identifiable lists of encounters available locally to be passed on in case of an event.**

**XML file, counts by zip by period only to Datacenter**

20	20	Fever	04/10/2003: New	1 to 4	M	Charlestown:02123	VIS	None	U	2	BTR
21	21	Fever	04/10/2003: New*	1 to 4	F	Randolph:02368	VIS	None	U	0	BTR
22	22	Fever	04/10/2003: New*	1 to 4	F	Cambridge:02138	VIS	None	U	1	SOM
23	23	Fever	04/10/2003: New*	1 to 4	F	Quincy:02169	VIS	None	U	2	BTR
24	24	Fever	04/10/2003: New*	1 to 4	M	Waltham:02451	VIS	None	U	1	WEL
25	25	Fever	04/10/2003:(Last 09/April/2003)	1 to 4	F	Everett:02149	VIS	None	U	1	SOM
26	26	Fever	04/10/2003: New*	1 to 4	M	Somerville:02145	VIS	None	U	0	SOM
27	27	Fever	04/10/2003: New*	5 to 12	F	Wilmington:01887	VIS	None	U	1	PBY
28	28	Fever	04/10/2003: New*	5 to 12	F	Chelsea:02150	VIS	None	U	2	SOM
29	29	Fever	04/10/2003: New*	5 to 12	F	Saugus:01906	VIS	None	U	1	SOM
30	30	Fever	04/10/2003: New*	5 to 12	M	Dorchester:02125	VIS	None	U	1	CH
31	31	Fever	04/10/2003:(Last 10/April/2003)	5 to 12	M	Milton:02186	VIS	None	U	0	BTR
32	32	Fever	04/10/2003: New*	5 to 12	F	Watertown:02472	VIS	None	U	0	SOM
33	33	Fever	04/10/2003:(Last 02/March/2003)	1 to 4	F	Cambridge:02139	VIS	None	U	1	SOM

# XML - counts to Data Center

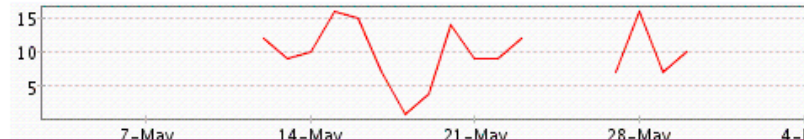
```
<Period>
  <startTimeStamp>2003-04-10T01:00:00-05:00</startTimeStamp>
  <endTimeStamp>2003-04-11T00:59:59-05:00</endTimeStamp>
  - <geography TYPE="ZIP">
    <geovalue>01463</geovalue>
  - <syndrome TYPE="Respiratory">
    - <payer NAME="PR">
      <count>1</count>
    </payer>
  </syndrome>
</geography>
- <geography TYPE="ZIP">
  <geovalue>01527</geovalue>
- <syndrome TYPE="Hemorrhagic">
  - <payer NAME="PR">
    <count>1</count>
  </payer>
</syndrome>
</geography>
- <geography TYPE="ZIP">
  <geovalue>01581</geovalue>
- <syndrome TYPE="Fever">
  - <payer NAME="PR">
    <count>1</count>
  </payer>
</syndrome>
```



This is an experimental display  
showing all counts from all data providers for the last 30 days

[Show Previous YEAR](#)

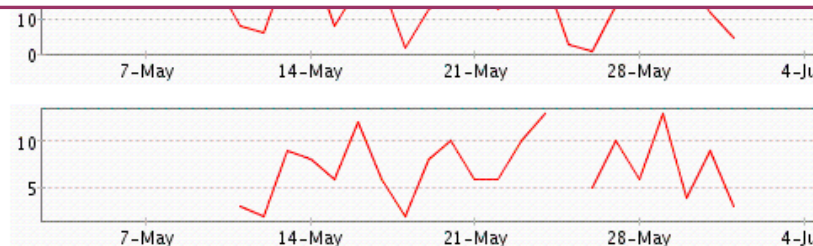
Botulism-like



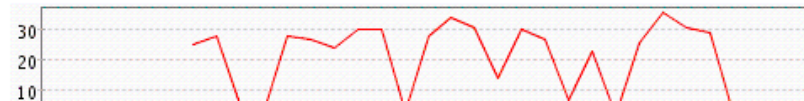
**Data viewable as time series within  
minutes of arrival at datacenter**

**GLMM being run as historical data  
becomes available.**

Lymphatic



Neurological





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- ◆ Issues and challenges
- ◆ Conclusions

# Issues: non-technical

- ◆ Surveillance data model
  - ◆ Traditionally centralized identifiable
  - ◆ Alternative - only counts centralized
- ◆ HIPAA
- ◆ Privacy/Security
- ◆ Authentication & administration
- ◆ Data presentation, visualization
- ◆ User interface for ad-hoc queries
- ◆ Notification - who, how, when

# Issues: technical

- ◆ Noisy data!
- ◆ “Optimal” models
- ◆ ICD9 granularity  $\Rightarrow$  Syndromes
- ◆ “Optimal” syndromes & ICD9 mapping
- ◆ Standards for data exchange - XML
- ◆ Authentication and access control
- ◆ Security for internet services - SSL

# Overcoming challenges

- ◆ Shared definitions - CDC led workgroup
- ◆ Ad hoc queries.
- ◆ CDC PHIN/NEDSS compliance
- ◆ Open source infrastructure
- ◆ Open standards
- ◆ Open source code

# Lessons

- ◆ EMR works for timely surveillance
- ◆ Distributed processing model works
- ◆ Design for additional data sources
- ◆ Standardized syndromes
- ◆ Standardized data exchange
- ◆ Strong encryption
- ◆ Best security practices



showing

## Collaborators

t 30 days

Botulism-like

- ◆ Richard Platt
- ◆ Ken Klienman
- ◆ Inna Dashevsky



Fever

- ◆ Katherine Yih
- ◆ Courtney Adams
- ◆ Virginia Rego



Gastrointestinal



Hemorrhagic



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# Data flow

